Adaptive Transmit-Side Equalization for Serial Electrical Interconnects at 100 Gb/s Using Duobinary

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***Abstract*— The ever-increasing demand for more efficient data communication calls for new, advanced techniques or high speed serial communication. Although newly developed systems are setting records, off-line determination of the optimal equalizer settings is often needed. Well-known adaptive algorithms are mainly applied for receive-side equalization. However, transmit-side equalization is desirable for its reduced linearity requirements. In this paper, an adaptive sign–sign least mean square equalizer algorithm is developed applicable for an analog transmit-side feed-forward equalizer (FFE) capable of transforming non-return-to-zero modulation to duobinary (DB) modulation at the output of the channel. In addition to the derivation of the update strategy, extra algorithms are developed to cope with the difficult transmit–receive synchronization. Using an analog six tap bit-spaced equalizer, the algorithm is capable of optimizing DB communication of 100 Gb/s over 1.5 m Twin-Ax cable. Both simulations and experimental results are presented to prove the capabilities of the algorithm demonstrating automated determination of FFE parameters, such that error-free communication is obtained (BER< 10^{-13} using PRBS9).**

***Keywords*— Duobinary, feed-forward equalizer, analog equalization, adaptive equalization, least mean squares.**

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